

## Part One. Basics

### Chapter 1 Introduction

**1-1. Field Water Supply.** In the theater of operations (TO), the tactical or installation commander provides water-support requirements to the combat service support (CSS) elements. The CSS elements' task is to provide water. Requests for well-drilling support go through operational channels to corps or theater army headquarters.

Tactical and logistical personnel plan and coordinate water-support functions. They ensure that sufficient water-production and distribution assets are available to continuously support the forces in the TO. Planners should consider the following items when locating well sites:

- Tactical situation.
- Geographical area of operations (AO).
- Location of existing water sources.
- Size of the force being supported.
- Planned force-deployment rates.
- Dispersion of forces in a geographic area.
- Water-consumption rates and anticipated well capacity.
- Availability of transportation to move well-drilling equipment and well-completion materials.
- Logistical support and main supply routes.
- Availability of assets for water distribution.
- Time required to drill and prepare a well for production.

Groundwater sources are normally used to supplement surface-water sources. In arid environments, exploring and using groundwater can reduce the need to transport water to a desired location. Groundwater may also be used when threat forces employ nuclear, biological, chemical (NBC) munitions, which could contaminate surface-water supplies in the TO.

#### **1-2. Water Detection.**

a. *Responsibilities.* In an undeveloped or a developed TO, terrain analysts, ground-survey teams, and well-drilling teams identify surface-water and groundwater sources. Water detection may be provided for all forces in the TO with assets from the Water Detection Response Team (WDRT). See Appendix A for details on the WDRT. Engineer ground-survey teams determine whether a groundwater source is adequate and accessible for development.

b. *Procedures.* Analysts use surface-water, groundwater, and existing-water-facilities overlays from the worldwide Water Resources Data Base (WRDB) (Appendix A). Surface- and existing-water-facilities water sources are identified primarily from maps and visual inspection. Groundwater sources are identified by analyzing information from groundwater-

resources overlays, maps, aerial imagery, terrain studies, hydrologic and geologic data, well-drilling logs, and local-national sources. Two methods of locating groundwater are--

- Method 1. WDRTs, equipped with special devices that use geophysical techniques (electrical resistivity and seismic refraction), may be deployed to locate groundwater.
- Method 2. Well-drilling teams may drill exploratory or test wells to detect groundwater.

The second method is accurate but time-consuming. Teams should use this method only if all other water-detection methods are unsuccessful or are not available. The methods used for detecting water depend on the urgency for finding groundwater and the resources available. Speed and accuracy are essential for locating water in any TO.

*c. Equipment.* The WDRT's water-detection equipment can be deployed by air, sea, or ground transport into a developed or undeveloped TO.

**1-3. Well Drilling.** Wells provide water to the deployed forces in an undeveloped TO, to the forward deployed units in a developed theater, and to the forces that occupy permanent or semipermanent, freed Army installations in a developed TO. Wells are located and drilled in secure areas in an installation or in the area of operation at brigade level or higher.

*a. Forward Deployed Forces in a Developed TO.* Well-drilling operations support forward deployed forces and force buildup in a developed TO. Groundwater sources supplement, but do not replace, surface-water sources. Well-drilling teams conduct well-drilling operations during all phases of an operation. Rapid movement of the well-drilling team into the TO is not essential. Teams with organic equipment arrive at the TO primarily by sea or ground from pm-positioned locations. The teams depend on engineer units for logistical and administrative support. Transportation support is required for movement of will-drilling equipment and components.

*b. Permanent or Semipermanent Fixed Installation Forces in a Developed TO.* These echelons-above-corps (EAC) installations are located in built-up or rural areas where water sources may be available. Groundwater sources supplement existing water sources to meet installation water requirements. The wells are permanent. The facilities engineer manages all water utilities on an installation.

*c. Combat Zone (Corps Level and Below).* The Operations and Training Officer (US Army) (S3) of the engineer battalion that the well-drilling team is attached to coordinates operations with the quartermaster unit. When the well-drilling team completes a well, they turn it , all installed equipment and technical specifications over to the S3. The S3 then turns the operation over to the quartermaster unit. The quartermaster unit is responsible for--

- Drawing water from the stave tank to purify, treat, store, and distribute water.
- Operating all equipment at the well site, to include the well pump and generator.
- Maintaining all equipment except the well pump and screens.

Any well repair or maintenance that exceeds the capability of the responsible quartermaster unit will be coordinated through the staff engineer of the corps support group or the engineer unit that supports the area.

d. *Communications Zone (EAC)*. The well-drilling team's S3 coordinated operations with quartermaster units, civil-affairs units, or host-nation support personnel. When the well-drilling team completes a well, they turn over the operating well, all installed equipment, and the technical specifications to the S3, who then turns the operation over to the facilities engineer. The facilities engineer coordinates with the quartermaster planners, civil-affairs personnel, or the host nation regarding well operations and maintenance. Host-nation support is used whenever possible to support well-drilling operations.

#### **1-4. Well-Drilling Teams.**

a. *Army*. Army well-drilling teams have qualified personnel and equipment to drill and develop water wells and to repair wells on a limited basis. Field water supply is an Army combat service support function; however, Army engineer organizations are responsible for the following water-related actions in a TO:

- Surveying, identifying, and compiling data pertaining to surface-water sources to supplement existing data.
- Compiling data using information, such as well-drilling logs and ground surveys, to establish well-drilling sites for groundwater.
- Well drilling by teams that are organic or attached to nondivisional engineer units.
- Constructing and repairing rigid water-storage tanks and water pipelines, when used.
- Improving water-point sites requiring construction support.
- Constructing and maintaining permanent and semipermanent water utilities at fixed Army installations, including water wells.

To accomplish the well-drilling mission, well-drilling teams (with organic equipment) are deployed to the TO by air, sea, or ground. Each team has a truck- or semitrailer-mounted drilling machine. They use these machines to reach deep aquifers and develop wells. Teams also have well-completion kits. Kits include the casing, screen, pumps and generators, and other necessary equipment needed to provide an aquifer-to-storage-tank capability. The teams depend on engineer units or the facilities engineer for logistical and administrative support. Transportation support is required to move well-drilling equipment and components.

b. *Navy*. See Appendix B for information on Navy well-drilling teams and operations.

c. *Air Force*. See Appendix C for information on Air Force well-drilling teams and operations.